

Experiences in Collecting Data on Farm Forest Enterprises over More than Three Decades

Helmut Brandl

Accepted: 19 August 2010 / Published online: 11 February 2011
© Steve Harrison, John Herbohn 2011

Abstract This paper documents the development of the Accountancy Network in farm and small-scale forests in Baden-Württemberg, Germany, from its inception until today. The main emphasis of the paper is to describe the experiences stemming from the establishment of the network and running it for more than 30 years. The paper discusses the historical developments and their motivations. It points out the positive and negative factors which influenced the development. Statistical and accounting issues are described as examples of conflicts between scientific exactness and practicability and the respective solutions are presented. The reasons for the network's establishment, including its legal framework, how it was established and arising problems and difficulties along with general information, results and its main benefits are the topics of the paper. The main idea of the network was to obtain economic figures which were trustworthy and would meet the requirements of the users. Farmers were interested in obtaining key data about their situation so they could manage their forests in a better way. The decision-makers in administrative and political arenas were interested in better information on the economic situation of this type of private forestry. These requirements necessitated statistical representativeness and the application of accounting principles similar to those of industrial enterprises. This design has been successful; the financial results obtained have been judged as useful by all groups who were interested in the figures. Therefore, the network will continue.

Keywords Farm forestry · Small-scale private forest enterprises · Cost-accounting network · Economic monitoring system

H. Brandl (✉)

Department of Forest Economics, Forest Research Institute Baden-Württemberg, 79110 Freiburg, Germany
e-mail: brandl-freiburg@gmx.de

The Background of Accountancy Networks: Reasons and Legal Framework

In highly industrialized countries, agriculture and forestry has not been able to participate in the rapid progress of the industrial sectors of the economies. In the early 1960s, forestry in Baden-Württemberg in Germany was characterized by increasing costs and diminishing returns from timber sales. Primary production was at a comparative disadvantage to the highly industrialized production of goods in large factories. There was a low potential for rationalisation in agriculture and forestry. As a result, farming viability was decreasing and there was a danger of socio-economic erosion and depopulation of rural areas. This would have had negative impacts on the contributions of forests to environmental and recreational purposes, with reduced non-market benefits and services of forests (including reduced water catchment protection, habitat creation, conservation and recreation).

As a consequence of declining forest profitability, there was a demand for public support through policy measures allowing farm enterprises to survive and stabilize their incomes. From the public perspective, this would ensure the availability of all goods, services and benefits of forests, particularly in rural and mountainous areas. The types of public support judged to be necessary included financial incentives and intensification of extension services (advice and technical help), mainly to be provided by the state forest administration.

In the political arena, profitability information was needed to determine what the appropriate level of public support should be because the support measures were generally considered to be insufficient. Demand for information came mainly from stakeholders—for example members of parliament and administrative staff in the responsible ministries. Basic information was needed to assess the financial performance of farm forestry. This would require a comprehensive analysis of the profitability of non-industrial private forestry. It was also recognized that forest owners had a need for information on the financial consequences of their management activities as a basis for rational decision making. The solution to these information needs was clearly the establishment of an accountancy data network of farm forest enterprises as a socio-economic monitoring system (Brandl et al. 1999).

This general insight into the disadvantageous situation for the forestry and agriculture had been followed by various steps of translation into action. In Germany, the parliament and executive bodies (ministries and administration) recognized the need for public support to farmers so that they could survive. In 1956 an agricultural act (*Landwirtschaftsgesetz*) was enacted at the federal level. The various states followed with their own laws, e.g. Baden-Württemberg in 1969, and renewed in 1972 as the *Law on Agriculture and Rural Culture* (*Landwirtschaft und Landeskulturgesetz*). As a first step, the federal Ministry of Agriculture was instructed to present a ‘Green Report’ (Grüner Plan or Grüner Bericht) to the parliament and the public every year. The aim of this report was twofold, namely to provide an analysis of the economic situation of farms and farmers in Germany and to describe in detail the possibilities of public support for farmers.

As a source of data for this report, an accountancy network with obligatory book-keeping has been established. Since 1956 about 9,000 farms are participating in this

country-wide network and providing agricultural data. In 1965 the political scope of monitoring and reporting was extended to forestry, the industry suffering from declining timber prices. The forestry activities started in 1965 with establishing a separate accountancy network of communal and private forest enterprises greater than 200 ha.

The limit of more than 200 ha was laid down as appropriate to the size class distribution: mainly in communal forests this size class represented a high percentage. Private forests on the federal level also have a high share of this size classes (Schmid 1997).

Another reason to start with enterprises in the size class above 200 ha was the requirement that data from bookkeeping and from 10-years management plans including a natural inventory had been available. In smaller enterprises often this was not the case. When establishing an accountancy network in the lower size classes often it was necessary to introduce a bookkeeping system as a prerequisite.

The main responsibility for the network was given to the individual states. The executive agencies (mainly the respective forest research institutes) had to carry out the tasks of identifying and selecting the enterprises and introducing bookkeeping systems as well as collecting and checking the data. A centralised analysis of all data was performed at the federal level by the Federal Research Centre for Forest and Forest Products in Hamburg which generated the financial reports.

In Baden-Württemberg a different situation compared with most other states of Germany can be found. About 65% of the area of private forests belongs to the size classes below 200 ha. From this forest area about 38% can be characterized as farm forests. These farm forests, of 5–200 ha in size, play an important role in the income situation for the whole farm. In such combined enterprises the financial contribution of the forest was often unknown and therefore neglected in the financial status of the farm. An urgent need for better information about this special type of ownership had been realised (Schmid 1997; Brandl et al. 1999).

In 1972, the Department of Economics at the Forest Research Institute of Baden-Württemberg started a separate accountancy network, including farms and privately owned non-farm properties carrying forest areas of 5–200 ha. The basis for this new, supplementary network was the aforementioned *Law on Agriculture and Rural Culture* from 1972. This law required the Forest Research Institute of Baden-Württemberg to collect data also from forest or mixed enterprises with less than 200 ha of forest land.

The aims of this special network, especially as regards farm forests, were defined as to conduct:

- studies and investigations at the macro-economic level (to generate information on size, structure and importance of farm forests at the regional or state level); and
- studies at the micro-economic level to characterize the economic role of forests for individual enterprises, i.e. to conduct an analysis of costs and returns from the forestry parts of the enterprises.

In order to comply with the task of running two different accountancy networks, more staff were recruited by the Department of Forest Economics. A new research

group was established comprising three forest researchers and a secretary. Tasks performed by this group included the establishment of a database network on statistics about the structure of farm and small-scale forests as well as the establishment and running of an accountancy network of farm and other small-scale forest enterprises. This new accountancy network was limited to forest areas between 5 and 200 ha for a number of reasons. The upper limit (200 ha) was determined by the existing network of forest holdings managing more than 200 ha. The minimum limit of 5 ha was found by experience and calculations as a size which would normally allow yearly felling and thus a continuous management in contrast to occasional felling and ad hoc management (Brandl et al. 1999).

The Establishment of the Accountancy Network on Small-Scale Forestry in Baden-Württemberg

In the network preparation phase an important decision was made regarding the selection of participating forest owners. Originally, it was intended to mail a questionnaire on costs and revenues to forest owners following a random sampling design and using accessible sources such as registers of forest owners. However, this proved to be impossible because most forest owners did not have any bookkeeping systems. So as a first step a bookkeeping system had to be introduced as a prerequisite for participating in data collection. As a consequence, the selection of forest owners who were willing to participate had to be organized by personal contact between interested farmers and members of the research group. Consequently, the expressiveness of the collected data was limited. The results, analysed with respect to key figures, were far from being representative for the total private forestry with holding sizes of 5–200 ha.

A feasibility study for the development of an accounting network was conducted in 1972–1973. This study was designed to determine:

1. what data relating to forests were available;
2. the willingness of forest owners and their families to introduce and run a book-keeping system and to share the information with the research group; and
3. the requirements of the network, in terms of intensive support by the state forest administration and differentiation by regions.

The group conducting the feasibility study reported in 1974, finding that the conditions were favourable for the introduction of an accountancy network on farm forestry. As a consequence, an official order was made to the Forest Research Institute by the state forest administration (Ministry of Agriculture) to establish and run an accountancy network of farm forest enterprises.

The accountancy network was established in 1974–1975. The search for farmers who were willing to take part was organized by officers of the state forest administration who had long established personal contacts with woodland owners due to their extension work. This first fieldwork involved personal visits to the farms by members of the research group who were accompanied by the locally responsible

forester. The network system was explained and in cases where farmers were interested, arrangements were made to introduce a record-keeping system.

In 1975 the investigation started with 180 farm forest enterprises in four regions. This investigation had been concentrated on economic data. Public goods or ecosystem services could not be included due to the problems in finding reliable data. The requirements identified for the annual data recording included:

Revenue—including value of own consumption—from the forest part of the farm, comprising:

- timber crop (amount, assortment);
- accessory production (Christmas trees, branchwood used for decoration);
- further gross yield (especially returns from hunting leasehold and reimbursement for damage caused by game); and
- subsidies and financial support for various measures (subsidies for investments are divided up into periods, depending on the average lifetime of the investment, e.g. chainsaws 5 years, forest tractors 10 years, forest roads 20 years).

Costs—including expenses for harvesting, silvicultural-treatment, roads, administration and other businesses, divided into four distinct cost centres. In principle, full costs and revenues are recorded; the VAT is included.

Human labour input and use of tractors in hours including:

- the work input registered by hours and cost centres comprising owners own work with calculated wages (all family members), workers with contract of employment, and seasonal workers without a contract;
- hours and costs of each tractor working in the owner's forest.

In addition to the detailed registration of hours worked in the forest, total working hours including farming were also registered. The remaining costs were registered according to the following cost categories:

- materials (e.g. plants, spare parts, small tools);
- payments to contractors;
- costs for hired machines;
- depreciations and new investments;
- variable costs of machinery operation;
- losses (e.g. caused by theft or damage for instance storm, snow, insects);
- costs for administration assigned to the owners' forest (e.g. land tax, farm insurance, accident insurance, costs of building construction and maintenance, charges for individual advice from the state forest administration, contributions to forest cooperatives, purchase and operation of cars).

The practical experience with preparing and running the investigation demonstrated some highly important and essential conditions to convince farmers to join the network. These were:

- only the forest part of the enterprise is recorded;
- all information and figures are handled confidentially with electronic processing carried out anonymously;

- there is no transmission of data from a single enterprise to the tax office or administration; and
- the Forest Owners Association supports the network.

Through the years, one key factor could be regarded as the decisive factor in building up confidence between the farmers, the research group and the local forester. This was delivering the clear advantages to the farmers which had been promised and fixed as:

- an annual bonus of 240 € (initially 77 €);
- a free forest management plan every 10 years;
- an annual analysis of participants own financial data with a personal explanation from a member of the research group; and
- regional averages of ratios to compare with their own figures.

The annual input required on behalf of the Forest Research Institute was calculated as follows:

- Personnel—1.5 persons per year of network operation;
- Financial—other operating expenses 250,000–300,000 €.

The total costs of the network comprise also the involvement of the district forest offices. However, this part of the input is not accounted for. The research group used the results to publish annual reports, written articles for forest and agricultural journals and contributions to macroeconomic studies (Nain 1998a, b, c; Brandl et al. 1999; Brandl and Nain 1999a, b).

Accounting Network Problems

Some difficulties in operating the network and limitations in regard to the significance of the results were detected (Nain 1998a, b, c; Brandl et al. 1999; Hakkarainen et al. 1999).

The Question of Representativeness

Under ideal conditions, the results generated from the collected data could be considered as representative of all private forestry in the size class of 5–200 ha. But due to the specific peculiarities of this investigation, the possibilities of interpreting the results are limited to some extent. The main factors for the restrictions are:

- the selection of participating farm enterprises could not be made randomly. A prerequisite of the investigation was that each farmer could decide to participate or not. The principle of voluntariness is a self-selection bias, but does not preclude random sampling at an initial stage.
- the accounting groups participants may have greater interest and motivation in the financial results of their forest activities than the average forest owner. Therefore, the results might, to some extent, be better than the average.
- the fact of continued participation might also be regarded as reflecting sample bias.

Therefore the results cannot be characterized as truly representative for this category of private forest owners. Nevertheless, the results are based on a comparatively large number of participants (160–170). Therefore, some statistical calculations show acceptable results. The sampling error for key figures is less than 10% (5–6%). The calculated minimum number of farms with an acceptable mean error is 140 farms. For stratification into type classes 20 enterprises are needed. Thus with 160–170 participants in the network and 20–25 in each type class, these requirements have been fulfilled.

The Restrictions of an Income Statement in Terms of Data Analysis

A special type of results accounting system, adapted to the needs in agriculture and forestry, was used for the calculation of financial results. Some concepts, principles and rules of business economics could not be applied. A balance sheet, or adjusted balance sheet, was not possible (Nain 1998a, p. 70; Hakkarainen et al. 1999), due to:

- lack of a monetary value of the forest property;
- no allowance for interest on invested capital—also the calculation model is based on the fiction of a farm without debts or leasehold or any other liabilities—the federal agricultural network also does not include liabilities. Interest charges for loan capital or leasehold for forest areas must be paid from the net profit of the whole enterprise.
- the fact that changes of the value of the assets from 1 year to the next cannot be measured. It is not possible to value the growing stock and the increment from year to year, as is required in an adjusted balance sheet.

Other Difficulties Observed in the Accounting Network

From the initial launch of the network, adequate labour input was an important prerequisite for the success of the accountancy network. Only by establishing personal contact between farmers and research staff could the quality of the collected data meet and sustain the high standards required. Especially during the initial stages, a very high input was necessary to convince farmers to introduce a bookkeeping system, to communicate with woodland owner organizations and to search for persons of influence amongst farmers who could convince more forest owners to keep records. This means that the research personnel had to be particularly suited to communicating with the farmers.

The large number of research personnel had been criticized. At first it was not asked if this staffing level was essential. Confronted with this doubt, the necessity of this input was discussed at the ministerial level and initially accepted.

Some years later the need for this input was questioned. For a short period, the input was reduced and some of the tasks were outsourced, with the consequence that some farmers complained and some even ceased participating. The long-term design of the investigation was a critical point, too. The need for this level of labour input could be demonstrated by making reference to periods when the personnel available was reduced and when researchers who visited the farms changed often

and were unknown to the farmers. In such years the number of participants was substantially lower. The existence of the network was at stake and this led to the question of how long the network should exist. Critics of the long-term concept could be convinced by and by because the longer the investigation existed, the more the value and quality of the results became obvious. Some effort and commitment was needed to overcome such criticism but in the end the value of the investigation was generally acknowledged.

The Nature of the Accounting Results

The main results of the data analysis are lists of approximately 200 key variables or every year since 1979. These provide comprehensive information on the economic situation of farm forestry. The correlation between costs, revenues and success dimensions such as family income and net income is demonstrated in Table 1.

An additional element to the ordinary accounting system was introduced from the outset. Due to family labour playing a key role in the management of farms, the hours worked in the forest by members of the owner's family were registered in detail. Special registration forms were designed for documenting the input of family labour according to cost centres. It was the first investigation on the amount of working hours performed by family members and of other workers in a forestry accountancy network. This input of family labour was surprisingly high compared to the working hours per hectare or per cubic metre of harvested timber documented in larger forest enterprises. When working in their own forests, private forest owners needed almost twice the input of large-scale forest enterprises which employ trained forest workers. This indicates the importance of daily records of working hours of the owner and their family in order to calculate the costs of family labour as realistically as possible.

The most important key figure in the income statement is *the income of the family*. It is the most informative measure of the financial contribution of the forest activity to the entire income of the family. The key figure 'income per working hour (of the family)' allows comparisons with results from agriculture and wage rates in other jobs (Brandl 1998; Brandl and Nain 2000).

Table 1 Overall revenue and cost structure adapted for forestry accounting

Revenues			
Subsidies	Timber products		Accessory products
Costs	Income		
	Family income		
Non-labour costs	Wages for employed workers	Imputed costs for family labour	Net income

Benefits Gained From Having an Accountancy Network

In spite of the earlier mentioned restrictions, the value of the investigation and the subsequent results should not be underestimated. Some of the benefits are:

- the results allow judgements on costs, revenues and income from the forest part of the enterprise. This is a category of forest ownership for which there is normally little economic research focus.
- the results can be used as indicators for the profitability of farm forestry as compared to agricultural production or other sources of income (Sekot 1990).
- trends in key figures can be identified due to the long-term concept of this information system.

Benefits from the accounting network have been identified for various stakeholder groups.

Benefits for the Participating Farm Enterprises

The analysis of the collected book-keeping data should first and foremost be useful and helpful to the network participants themselves and secondly to other farmers. Over the years some developments and progresses were observed by the research group. The introduction of a bookkeeping system specifically for the forest and the results of the analysis provided new instruments for better decision-making to enterprise owners. The interpretation of the financial results has improved the understanding of the consequences of forest activities. For example, the number of working hours which members of the family worked in their forests had previously not been accounted for and had therefore been disregarded in many cases. The key figure ‘family income per working hour’ was unknown without bookkeeping. However, for the efficient organization of the labour capacity for the various activities of the whole farm (agriculture, forestry and others) this figure is of utmost importance. The input of labour could be shifted to the activity with the highest return per hour invested.

In addition, knowledge of the number of hours worked in the forest was a stimulus to rationalize this labour input. This learning effect is demonstrated in Table 2 which shows the average labour input per hectare and per cubic metre of timber over a five-year period for farms in the accountancy network.

Table 2 Five-year average working times for farm forests with 5–200 ha

Time period	Working time (h/ha)	Working time (h/m ³)
1979–1983	19	3.1
1994–1998	14.7 (–23%) ^a	1.94 (–27%)
2003–2007	12.7 (–36%)	1.22 (–61%)

^a Figures in parentheses represent percentage differences relative to the period 1979–1983

Naturally these indicators for rationalization cannot be attributed exclusively to the benefits derived from participation in the network. Other influences and developments as general improvements in terms of skill, technology and equipment, as well as an increasing substitution of family labour by contractor's work, may also account for the bulk of the improvement achieved.

Other examples can be found demonstrating the usefulness of the economic results to improving management efficiency of the whole enterprise, such as better sorting of felled trees leading to higher timber prices, and reducing costs by adding specialized equipment to agricultural tractors (such as winches better adapted to forest work). Due to these benefits, participating farmers remain in the accounting network for a long time. From 1974 to 1998 only 31% of participants gave up their membership. This stability continues today.

Benefits for the Agriculture and State Forest Administration

The annual reports, publications and lectures provided a large volume of information which assists in the training of all members of the staff who are involved in extension services addressing private forest owners. The economic role of the forest part in the whole enterprise can be better assessed when giving individual advice to an enterprise. People working in extension services may use the general empirical dataset from the reports in cases when the farms do not have individual data at their disposal. Or they can use individual accountancy data if the farm is participating in the accountancy network.

The results of the forest network provide the extension staff of the agricultural administration with information on the financial situation of the forestry part of the farm. This reduces the ignorance and helps to avoid giving misleading advice.

Information generated is used for structural analyses at the regional and state level and provides material for development plans, e.g. for the Black Forest Programme 1971. The purpose of this program was to analyse the strengths and weaknesses of agriculture and forestry in the Black Forest and to suggest what kinds of support were needed. Another regular task is to formulate a chapter about the economic situation of farm forestry for the annual report to the Ministry of Agriculture on the economy of the agricultural and forestry sector.

Special calculations can be performed, such as a special and generalizing calculation on the regional differences of family income for the establishment of compensatory payments for farmers being situated in disadvantaged regions with low productivity (e.g. Ausgleichszulage Wald).

Benefits for Institutions Engaged in Information and Research

The large amount of information produced allows a wide range of uses to interpret and analyze the material with special methods and mathematical models. Results of such deeper investigations are:

- yearly reports of the results;
- publications by researchers;

- data analysis by other scientists for specific purposes, e.g. diploma theses, PhD theses and further publications by scientists from foreign countries (e.g. Japan); and
- information material for other organizations such as Forest Owner Associations, e.g. diagrams or special analyses for defined purposes.

Benefits at the International Level

Within the framework of the International Union of Forest Research Organizations (IUFRO) a new group ‘Small-scale Forestry’ (Group 3.08) was established in 1986. The first three conferences of this group were concentrated on accountancy networks and used these results. The main conference themes were the methodology of accountancy networks and establishment and running of an accountancy network. The accountancy network in farm forestry in Baden-Württemberg has been used as an early example of such networks. The results and experiences have been spread throughout the international community of forest researchers. During the initial phase of the Small-scale Forestry group, discussions regarding the accountancy network provided a solid and attractive base for researchers from other countries. It was one factor for the success of the group in the years following its foundation and helped to establish this group.

The Forest Research Institute of Baden-Württemberg contributed to the European MOSEFA project, a concerted action of the EU to monitor the socio-economic situation of European farm forestry (Nain 1998a, b, c). The objectives of this action were to support the continuing attempts to modernise the existing forest accountancy networks and to establish new ones in various countries.

The Forest Research Institute provided several contributions to this action which have been published including reports on:

- the farm forest situation in Germany;
- methodological issues of cost accountancy in farm forest enterprises;
- sampling schemes of forest accountancy networks;
- country reports of results; and
- requirements for the MOSEFA Guidelines and the experiences in Baden-Württemberg.

As a result three reports analysing the socio-economic situation of farm forestry in Europe in a comprehensive way and guidelines for establishing farm forestry accountancy networks or MOSEFA-Guidelines were published (Hyttinen and Kallio 1998a, b).

Conclusions

Before starting the accountancy network in private farm and small forest enterprises, two guiding decisions were made. First, participation of forest owners in the network would be based on the principle of voluntariness. Second, the

selection of enterprises, the introduction of a book-keeping system and the data collection would be organized through personal contacts between participants and the staff of the Economic Department of the Forest Research Institute of Baden-Württemberg. The advantages of these decisions can be seen in:

- high trustworthiness of the collected data and as a consequence high quality results;
- high contentedness of participants due to the utility of the results;
- stable membership over many years; and
- multiple uses of the results in the administrative, research and political arenas.

Disadvantages which had to be accepted were the limited representativeness of the accounting group members and a relatively simple income statement (but adapted to the purpose of the survey).

Persistence and performance turned out to be essential for introducing and running an accountancy network. The design of such a survey should be based on a long-term concept. Continuity is required in order to achieve high quality of the data, the analysis and ultimately the results. This type of permanent survey is a classical task for state-owned forest research institutes. Persistence is needed to overcome hindrances and resistance, both from the scientific community due to not following exact scientific approaches and from the upper administration who had fundamental doubts about the necessity of the network and the justification for the high financial and personnel input. As a result of the experiences described above it can be said that it has been a fruitful decision to establish and run an accountancy network with this special design.

References

- Brandl H (1998) Zur regionalwirtschaftlichen Bedeutung der Forstwirtschaft im Schwarzwald. In: Sekot W (Hg) Beiträge zur Forstökonomik, Festschrift für o. Univ. Prof. Dr. Wolfgang Sagl. Schriftenreihe des Instituts für Sozioökonomik der Forst- und Holzwirtschaft Band 31, Universität für Bodenkultur Wien, pp 69–78
- Brandl H and Nain W (1999a) Cost accountancy network in farm-forest enterprises in Baden-Württemberg. In: Niskanen A (ed) Prospects of international statistics on farm forestry. MOSEFA concerted action project (Fair-CT96-1414). EFI Proceedings, no. 31, pp 105–116
- Brandl H, Nain W (1999b) Requirements of the MOSEFA guidelines and the experiences in Baden-Württemberg. In: Niskanen A (ed) Prospects of international statistics on farm forestry. MOSEFA concerted action project (Fair-CT96-1414). EFI Proceedings, no. 31, pp 97–103
- Brandl H, Nain W (2000) Small-scale forest enterprises in Baden-Württemberg, Germany. In: Harrison SR, Herbohn JL, Herbohn KF (eds) Sustainable small-scale forestry. Edward Elgar, Cheltenham, pp 160–164
- Brandl H, Hercher W, Lobell E, Nain W (1999) 20 Jahre Testbetriebsnetz Kleinprivatwald in Baden-Württemberg—Betriebswirtschaftliche Ergebnisse 1979–1998, Berichte Freiburger Forstliche Forschung, Heft 14
- Hakkaraian J, Penttinen N, Kajanus M (1999) Ratio analysis for non-industrial private forestry. In: EFI Proceedings no. 31, pp 13–32
- Hyttinen P, Kallio T (eds) (1998a) Cost accountancy in European farm forest enterprises. In: EFI proceedings no. 20. European Forest Institute, Joensuu, Finland

- Hyttinen P, Kallio T (eds) (1998b) Sampling schemes for monitoring the socio-economics of farm forestry. In: EFI proceedings no. 28. European Forest Institute, Joensuu, Finland
- Nain W (1998a) Methodological issues of cost accountancy in farm forest enterprises. MOSEFA-workshop A. 28-31.08.1997. In: EFI proceedings no. 20. Joensuu, Finland
- Nain W (1998b) Sampling schemas of forest accountancy data networks. In: EFI proceedings no. 28. Sampling schemas for monitoring the socio-economics of farm forestry. Joensuu, Finland
- Nain W (1998c) Country reports of on farm forestry as part of the national FADN system (Germany). MOSEFA-workshop B. 19-22.04.1998. In: EFI proceedings no. 28. Sampling schemas for monitoring the socio-economics of farm forestry. Joensuu, Finland
- Schmid S (1997) Die strukturelle und waldbauliche Entwicklung des Privatwaldes in Baden-Württemberg nach 1945. Agrarforschung in Baden-Württemberg, Band 27, Ulmer Verlag, Stuttgart
- Sekot W (1990) Forstliche Testbetriebsnetze. Schriftenreihe des Instituts für forstliche Betriebswirtschaft und Forstpolitik, Band 9, Eigenverlag, Wien